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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,581	06/19/2001	Rajiv Laroia	LAROIA 17-10-5-1 (375824/	2825
26479	7590	07/13/2005	EXAMINER CHANG, RICHARD	
STRAUB & POKOTYLO 620 TINTON AVENUE BLDG. B, 2ND FLOOR TINTON FALLS, NJ 07724			ART UNIT 2663	
PAPER NUMBER				

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. ✓ 09/884,581	Applicant(s) LAROIA ET AL.	
	Examiner Richard Chang	Art Unit 2663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 1, 6, 13, 14, 20 and 26-28 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-5, 7, 15-19 and 29-34 is/are allowed.
- 6) ☒ Claim(s) 8, 10, 21, 23, 35 and 36 is/are rejected.
- 7) ☒ Claim(s) 9, 11, 12, 22, 24 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Response to Amendment

1. Applicant's arguments and amendments with respect to claims 1-36 have been fully considered but are moot in view of the new ground(s) of rejection.

Claims 1,6,13-14,20 and 26-28 had been canceled.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 8, 10, 21, 23 and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over by US patent No. 6, 487,252 ("Kleider et al.") in view of US patent 6,654,429 ("Li").

Regarding claims 8 and 21, Kleider et al. teach a method, apparatus (Fig. 1 as transmitter and Fig.3 as receiver) and system for an improved synchronization of an orthogonal frequency division multiplexed (OFDM) communication systems comprising of:

a receiver (30, an OFDM receiver) for receiving an OFDM signal containing the pilot sequence with assigned to frequency bins (a multitone synchronization signal) (See Fig. 3, Col. 4, lines 8-17),

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a down-sampling and clock recovery element (61) (synchronization interval sampler) coupled to said receiver (See Fig. 6, Col. 6, lines 62-64),

an initial coarse estimation block (62,64,66,68 inside 35) performs best correlation for an initial time and the frequency offset estimation (an initial time and frequency offset estimator) connected to said sampler (61) and receiver (30) (See Fig. 3 and Fig. 4, Col. 4, lines 53-59 and Col. 5, lines 13-21), and

a refining estimation block (72,74,76 inside 35 as a time and frequency offset estimate refinement unit) performing best correlation for a fine time and the frequency offset estimation connected to the receiver (30), said sampler (61) and the initial coarse estimator (62,64,66,68 inside 35 as said estimator) (See Fig. 3 and Fig. 4, Col. 4, lines 53-59 and Col. 5, lines 21-31)

wherein a pilot tone assigned with frequency bins (a reference multitone synchronization signal) provided by a reference provider (33) is used by the initial coarse estimator (62,64,66,68 inside 35 as said estimator) and the refining estimation block (72,74,76 inside 35 as said refinement device) in calculating a time offset and a frequency offset of the pilot tone (said multitone synchronization signal), the receiver (30 said receiver) utilizing said time offset and said frequency offset to synchronize with said received OFDM signal (See Fig. 2, Col. 4, lines 51-68), and

the reference signal is preferably the pilot sequence which may be pre-stored in receiver (30) wherein the reference provider (33) also includes a frequency bins assignment table (See Fig. 3, Col. 17, lines 35-37 and lines 46-50), and the coarse index FFTs (62) performs in FFT on the received signal and

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the coarse index FFTs (64) performs in FFT transform of on the referenced data (said reference multitone synchronization signal) (See Fig. 4, Col. 5, lines 8-9).

Kleider et al. teaches substantially all the claimed invention but did not disclose expressly the particular application involving limitations of

“a first time interval and a second time interval; transmitting data at one or more data frequencies during said first time interval; and transmitting, during said second time interval, a synchronization tone, at one or more synchronization frequencies, for a predetermined time period, the frequencies of said synchronization tone being distinct from said data frequencies”.

Li teaches the data and pilot may interleave in time and at different frequencies (See Fig. 4, Col. 2, lines 34-46).

A person of ordinary skill in the art would have been motivated to employ Li in Kleider et al. in order to obtain a method and apparatus for an improved synchronization of an OFDM communication system and to take advantage of interleaving the data and pilot may in time and at different frequencies in claims 8 and 20.

The suggestion/motivation to do so would have been to interleave the data and pilot may in time and at different frequencies, as suggested by Li in Col. 2, lines 34-46. At the time the invention was made, therefore, it would have been obvious to one of ordinary skill in the art to which the invention pertains to combine Li with the Kleider et al. to obtain the inventions specified in claims 8 and 20.

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Regarding claims 10 and 23, as discussed above, these claims have limitations that is similar to those of claims 8 and 20 and the further discussion, thus it is rejected with the same rationale applied against claims 8 and 20 above.

Regarding claims 35 -36, as discussed above, these claims have limitations that is similar to those of claims 8 and 20 and the further discussion, thus it is rejected with the same rationale applied against claims 8 and 20 above.

Allowable Subject Matter

4. Claims 2-5, 7, 15-19, and 29-34 are allowed.

5. Claims 9, 11, 22 and 24-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if no art rejection can be applied.

Examiner's Statement of Reasons for Allowance

6. The following is an examiner's statement of reasons for allowance:

The prior art along or in combination fails to teach or make obvious the following limitations:

“an initial time and frequency offset estimator connected to said sampler and said receiver; and a frequency offset estimate refinement unit connected to said receiver, said sampler and said estimator, wherein a reference multitone synchronization signal is used by said estimator and

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said refinement device in calculating a time offset and a frequency offset of said multitone synchronization signal, said receiver utilizing said time offset and said frequency offset to synchronize with said received OFDM signal, wherein said initial time and frequency offset estimator comprises: a plurality of smoothed time-domain correlation estimators for outputting a series of time offset estimate and correlation estimate pairs, each pair related to a frequency offset estimate; and a selector for selecting a selected time offset estimate and a selected initial frequency offset based in part upon the selection of the frequency offset estimate and time offset estimate that corresponds with the largest value of correlation estimate" as recited in the independent claims 2 and 29.

"connected to said sampling means and said receiving means, for obtaining an initial time estimate and an initial frequency offset estimate of said OFDM signal; means, connected to said receiving means, said sampling means and said estimating means, for obtaining a frequency offset estimate refinement; and storage means, connected to said estimating means and said refinement means, for storing a reference multitone synchronization signal for use by said estimating means and said refinement means in calculating a time offset and a frequency offset of said multitone synchronization signal, said receiving means utilizing said time offset and said frequency offset to synchronize with said received OFDM signal, wherein said estimating means further comprises: a plurality of means for obtaining smoothed time-domain (TDC) correlation

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estimates, said smoothed TDC estimate means outputting a series of time offset estimate and correlation estimate pairs, each pair related to a frequency offset estimate; and means for selecting a selected time offset estimate and a selected initial frequency offset based in part upon the selection of the frequency offset estimate and time offset estimate that corresponds with the largest value of correlation estimate" as recited in the independent claim 15.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Chang whose telephone number is (571) 272-3129. The examiner can normally be reached on Monday - Friday from 8 AM to 5 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Chang
Patent Examiner
Art Unit 2663



RICKY NGO
PRIMARY EXAMINER

7/10/05